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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/576,070	12/20/2006	Friedrich Boecking	R.306610	4804
2119	7590	03/19/2009	EXAMINER	
RONALD E. GREIGG			COLEMAN, KEITH A	
GREIGG & GREIGG P.L.L.C.			ART UNIT	
1423 POWHATAN STREET, UNIT ONE			PAPER NUMBER	
ALEXANDRIA, VA 22314			3747	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/576,070

Applicant(s)

BOECKING, FRIEDRICH

Examiner

KEITH COLEMAN

Art Unit

3747

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 November 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 11-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 11-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/CD/CD)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 11-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Happel et al. (US Patent No. 4,266,727) and Schechter et al. (US Patent No. 4,381,077) in view of Benson (US Patent No. 3,501,099).

With regards to claims 11, 12, 13, 14, and 15, Happel et al. discloses a hydraulic booster assembly (See Figures 1 and 2) connected downstream of the actuator (28 and 27), and first and second control **chambers** (25 and 26, See Col. 4, Lines 62-68) associated with the injection valve member for actuating the valve member (16 and 18), the improvement wherein the hydraulic booster assembly actuated by the actuator (28 and 27) comprises **a first booster chamber (37) hydraulically connected to second control chamber (25) that actuates the outer needle part (16)~ and a second booster chamber (38) hydraulically connected to the first control chamber (26) that actuates the inner needle part (18). The first and second control chambers actuate the booster chambers. (See Col. 4, Lines 62-68)** a nozzle body (See Figure 1), **a multi-part** injection valve (16 and 18) member having **an inner needle part and an outer needle part** (i.e. inner and outer needle parts) received in the nozzle body (See Figure 1), and an actuator (28 and 27), and the injector (See Figure 1) having an injector body (See Figure 1). Happel et al. does not positively disclose a fuel injector for a common rail injection system for injecting fuel into a combustion chamber of an internal combustion engine. Schechter et al. discloses a fuel injector (10, Col. 2, Lines 60-62, 50, Col. 4, Line 1) for a common rail injection system (58, Col. 3, Line 68) for

injecting fuel into a combustion chamber of an internal combustion engine (Col. 1, Lines 8-10).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide the injector of Happel et al. with a fuel rail in view of the teaching to Schechter et al., in order to inject fuel.

As to a piezoelectric actuator, Benson shows using a piezoelectric actuator to actuate an inner and outer needle parts in Figure 9 and explicitly states using a fuel in Col. 4, Lines 15-30.

Since Schechter et al. explicitly states that the solenoids can be replaced by piezoelectric actuators (Col. 2, Line 40) or other actuating devices and also discloses an injector (10) having an injector body (12, Col. 2, Lines 60-61), a nozzle body (22, Col. 2, Line 67), an injection valve member (18, Col. 2, Line 65) embodied in multiple parts in the nozzle body (22, See Figure 1) with an actuator (near 42, See Figure 3, Col. 3, Lines 23-29), it would have been obvious to a person of ordinary skill in the art at the time the invention was made to substitute the actuator of Happel et al. with a piezoelectric actuator in view of the teaching to Schechter et al. and Benson, in order to control the fuel and air entering the injector (Col. 2, Lines 38-42 from Schechter et al.).

With regards to claim 19, Happel et al. discloses wherein the actuator is integrated with the fuel inlet (See Figure 1).

With regards to claim 16, Happel et al. discloses all the limitations of the claimed subject matter, including a pressure step (See Figure 1) embodied on the inner needle part (18), on the end thereof toward the combustion chamber (See Figure 1), except the hydraulic area of said pressure step on the inner needle part being operative in the opening direction of the inner needle part being less than the hydraulically operative areas of the first and second pressure steps of the outer needle part. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the hydraulic areas of Happel et al. with the hydraulic area of said pressure step on the inner needle part being operative in the opening direction of the inner needle part being less than the hydraulically operative areas of the first and second pressure steps of the outer needle part because the modification is invariably a change in size. See MPEP 2144.04. In *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. CIR. 1984), cert. Denied, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device.

With regards to claim 17, Happel et al. discloses all the limitations of the claimed subject matter except wherein the hydraulically operative areas, in the opening direction, of the pressure steps of the outer needle part exceed the hydraulically operative area on the end toward the combustion chamber of the inner needle part. It

would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the hydraulic areas of Happel et al. with wherein the hydraulically operative areas, in the opening direction, of the pressure steps of the outer needle part exceed the hydraulically operative area on the end toward the combustion chamber of the inner needle part because the modification is invariably a change in size. See MPEP 2144.04. In *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. CIR. 1984), cert. Denied, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device.

With regards to claim 18, Happel et al. discloses a first seat formed on the outer needle part (16) and a second seat formed on the inner needle part (18, See Figure 1), which seats cooperate with a wall of the nozzle body (See Figures 1 and 2).

With regards to claim 20, Happel et al. discloses a first injection openings (See Figure 1, from Figure 1 there are two openings, Left opening being the first opening) that can be opened or closed by the first seat (open and closed by inner valve 18, See Figures 1 and 2) and second injection openings (See Figure 1, from Figure 1 there are two openings, Right opening being the second opening) that can be opened or closed by the second seat (when 18 and/or 16 is opened or closed, See Figures 1 and 2), said

first and second injection openings being embodied on the nozzle body and opening in the direction of the combustion chamber (See Figures 1 and 2).

With regards to claim 21, the combination of Happel et al. and Schechter et al. discloses all the limitations of the claimed subject matter including Happel et al. disclosure of a fuel injector (10) for a common rail injection system for injecting fuel into a combustion chamber of an internal combustion engine (Col. 1, Lines 5-10), the injector (10) having an injector body (10), a nozzle body (18), a multi-part injection valve member (60,22) having an inner needle part (60) and an outer needle part (22) received in the nozzle body (18), and Schechter et al. disclosure of a piezoelectric actuator (Col. 2, Line 40) except positively disclosing a hydraulic booster assembly connected downstream of the piezoelectric actuator, and first and second control chambers associated with the injection valve member for actuating the valve member, the improvement wherein the hydraulic booster assembly actuated by the piezoelectric actuator comprises a second booster chamber acts upon a first control chamber for triggering the inner needle part, and a first booster chamber acts on a second control chamber for triggering the outer needle part.

Schechter et al. explicitly states that the solenoids can be replaced by piezoelectric actuators (Col. 2, Line 40) or other actuating devices and also discloses an injector (10) having an injector body (12, Col. 2, Lines 60-61), a nozzle body (22, Col. 2, Line 67), an injection valve member (18, Col. 2, Line 65) embodied in multiple parts in

the nozzle body (22, See Figure 1) with an actuator (near 42, See Figure 3, Col. 3, Lines 23-29).

Benson discloses a hydraulic booster assembly (See Figure 9) connected downstream of the piezoelectric actuator (242), and first (246) and second (258) control chambers associated with the injection valve member for actuating the valve member, the improvement wherein the hydraulic booster assembly actuated by the piezoelectric actuator comprises a second booster chamber (252) acts upon a first control chamber (246) for triggering the inner needle part (238), and a first booster chamber (260) acts on a second control chamber (258) for triggering the outer needle part (240).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the actuator of the combination of Happel et al. and Schechter et al. with wherein the hydraulic booster assembly actuated by the piezoelectric actuator comprises a second booster chamber acts upon a first control chamber for triggering the inner needle part, and a first booster chamber acts on a second control chamber for triggering the outer needle part in view of the teaching to Benson, in order to control the fuel and air entering the injector (Col. 2, Lines 38-42 from Schechter et al.).

Response to Arguments

1. Applicant's arguments, see Page 14, filed 11/5/2008, with respect to the actuation mechanism and hydraulic components have been fully considered and are persuasive. The 103 rejection of claims 11-21 has been withdrawn.
2. Tsumara et al. discloses an outer and inner needle portion and pressure build-up in chamber 24. However, there is no explicit teaching in the reference that actuation is caused by the build-up of air/fuel pressure in chamber 24.
3. However, in view of Happel et al., the teaching that Applicant seeks is found on Col. 4, Lines 60-68. Using hydraulic pressure from fuel, the reference ostensibly teaches Applicant's claimed subject matter and is deemed obvious in view of Benson.

As such, prosecution is reopened.

Conclusion

1. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Sturman (US Patent No. 4,266,727) shows the current state of the art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEITH COLEMAN whose telephone number is (571)270-3516. The examiner can normally be reached on 5:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Cronin can be reached on (571)272-4536. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KAC
/K. C./
Examiner, Art Unit 3747

/Stephen K. Cronin/
Supervisory Patent Examiner, Art Unit 3747